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ABSTRACT

The manual outlines the development of a hospital high risk registry for infants with hearing loss. A program conceptualization lists aspects of program planning, personnel, physical arrangements, financial administration, evaluation planning, records and reports, and coordination with other agencies. A guidelines section suggests a sequence of actions in developing such a program, beginning with knowing the literature. A cost estimate section presents figures for initial organization and annual operating costs based on 1982 estimates for a program at Richland Memorial Hospital in Columbia, South Carolina. Following a list of criteria for placing newborns on the high risk registry for hearing impairments is a sample of a proposal for the implementation of a newborn high risk register for hearing impairment. Sample forms (including information letters to physicians, information for the audiologist, and evaluation plans) are included. (CL)

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GUIDELINES FOR THE DEVELOPMENT OF A HIGH RISK REGISTRY PROGRAM FOR HEARING IMPAIRMENT

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INTRODUCTION

This packet was assembled to aid in the development of hospital high risk registry programs for detection of hearing loss in newborns. The information provided was obtained primarily from the planning and development of the pilot program at Richland Memorial Hospital in Columbia, South Carolina which began in June 1979.

It is important to note that the program design and examples provided should be used only as guides because each potential program setting will be different and may require alternative methods or procedures.

Hospital high risk registry programs remain the method of choice for detecting infants at risk for hearing loss and seem to be more cost effective than mass screening. Project SCOOTER is available for further help in program development or explanation of the information offered herein.

Any portion of the contents of this packet may be used for program development. It is requested that credit be given to Project SCOOTER in such cases.

SECTION I: Conceptualization of a High Risk Registry Program

The first step in setting up a High Risk Registry Program for hearing impairment is to become aware of all areas that must be developed and their components.

CONCEPTUALIZATION OF A HIGH RISK REGISTRY PROGRAM

I. Program Planning

- A. Rationale
- B. Goals, objectives
- C. Activities & time lines to achieve each goal, objective
- D. Flow chart (proposed)
- E. Roles & Responsibilities of personnel and local fiscal agency
- F. Inter agency cooperation (include programs for referral)
- G. Regular program review (evaluation)
- H. Procedures for informed consent, confidentiality, etc.
- I. Sample forms, letters, charts, etc.

II. Personnel

- A. Identify personnel needs & sources
- B. Responsibilities of each group (delineate)

III. Physical Arrangements

- A. Identify space available; arrange
- B. Identify equipment, supplies needed

IV. Financial Administration

- A. Budget
- B. Expending Funds

V. Evaluation Planning

A. Identification of audiences for the evaluation and their information needs

B. Identify the major areas of the program to be evaluated

C. Determine specific kinds of information to be collected for each component

D. Select procedures and/or instruments for collecting information

E. Select procedures to be used in analyzing & interpreting data

F. Determine staff responsibilities for evaluation

G. Establish timeline for data collection and analysis

H. Determine procedures for presenting evaluation to intended audiences

I. Establish system for continuous evaluation feedback to the staff

VI. Records and Reports

A. Design a records & Filing system

B. Periodic evaluation reports

VII. Coordination with other Agencies

A. Identify agencies (local, state) & services available

B. Establish liaisons

C. Meet with & clarify mutual supporting roles

Dissemination of Information-Public Awareness

1. Distribution of information on auditory development to mothers of newborns

2. Distribution of information on auditory development to Pediatricians, Family Practice, etc.

3. Radio, T. V., etc.

**NOTE: A good information source for developing media material is available through the American Speech-Language-Hearing Association, 10801 Rockville Pike, Rockville, Maryland, 20852. Entitled the ASHA Media Handbook, it contains basic information for a program desiring to advertise its services. FREE upon request for ASHA members.

SECTION II: Guidelines for the Development of a High Risk Registry Program

It is helpful to follow some kind of logical procedure in obtaining information, making contacts, putting a program together, providing in-service training and finally implementing the product. Section II. offers some guidelines.

GUIDELINES FOR THE DEVELOPMENT OF A
HIGH RISK REGISTRY PROGRAM

1. Know the literature. Study the available information provided in the literature: the rationale for the use of a high risk registry, the suggested criteria, the history of neonatal testing and the program outline. Project SCOOTER can provide an overview of the literature with references and a suggested flow chart for the program.

2. Know the geographical area to be served.

   (1) Find out what the available audiological services are in the geographical area. Talk with the audiologists and find out their interest in testing infants, if they are equipped to test infants and if they would support a high risk registry program. Find out the costs for such services. Organize and record your findings.

   (2) Find out the various habilitative services in the area (e.g. preschool programs for hearing impaired children, preschool services in speech and hearing clinics, services within the school system). Document your findings.

   (3) Explore the supportive services for hearing impaired preschoolers offered by third party sources (e.g. Crippled Children's Services, Medicaid, Champus , Easter Seals.)

3. Identify the contact person in the hospital. The contact person should be someone who would most likely be interested in hearing impairment and the significance it plays in the total development of a child (e.g. staff audiologist, speech pathologist, pediatrician, pediatric nurse, neonatologist, or obstetrician). You must have an

advocate on the hospital staff first. If the hospital has a Speech and Hearing Clinic, contact them first.

4. Meet with the contact person.

   (1) Discuss the rationale and program flow chart.

   (2) After obtaining his/her interest and support find out who the decision makers are that will provide ultimate approval for the program and the necessary steps to obtain it. Be sure to go through the proper and all channels. Your contact person is essential in helping you here.

   (3) You and the contact person should meet with the next higher up, explain your ideas, obtain his/her support. Be sure to keep that person informed and let them know in advance each step you intend to take.

5. Prepare a working draft of a proposal. With the consultation of your contact person compile the working draft of a program proposal. Include a rationale, history and proposed program design. Prepare all letters, forms,etc. to be used. Be sure to include an appendix with a flow chart, suggested forms, letters, criteria, and information to be distributed. Submit the typed working draft to the next higher up for suggestions, additions and deletions. He/she will be a key person in adapting the plan to meet the hospitals rules and policies. (See section V.)

6. Prepare the final proposal.

   (1) With the suggested changes have the final draft typed and approved by your contact person.

(2) Set a date to present the proposal to the final decision makers. Be sure to provide copies of the proposal to all persons involved at least 1 week before the meeting. Also, make a point of inviting persons at all levels of the decision process to the meeting. Make sure your advocates are there.

7. Present the proposal. Have your contact person present the proposal with your help. Use overheads, slides, illustrations to help describe your proposal.

8. Organize. When the proposal is accepted:
   (1) Set a proposed beginning date.
   (2) Have forms printed and files set up.
   (3) Find out which nurses, physicians, audiologists, third party groups, and other professionals will be involved in the administration of the program.
   (4) Set up meetings with each group to explain the entire program.

9. Meet with groups. Specify in detail the responsibilities of the group that you are addressing. Give them written copies of forms that would affect them and guidelines for their role in the program.

10. Set up a system for program evaluation.

11. Begin your program.

*** Project SCOOTER can provide materials and consultation in any one of the areas mentionned.

SECTION III: Estimate of Costs

Valuable information to have at hand is the Initial Organizational of Program Costs (Start-up Costs) and the Annual Operating Costs. The figures were obtained using information from the pilot High Risk Registry Program at Richland Memorial Hospital in Columbia, South Carolina.

Estimate of Costs

High Risk Hearing Registry Program
(1982)

A. Initial Organizational of Program Costs:

Estimated cost for the hospital staff to investigate and organize the start-up of the program. (50 hours of audiologist's salary $18,000)	$ 450.00
Miscellaneous start up cost	
Secretarial (2 hours based on $10,000 salary)	10.00
Xerox (6¢/copy)	20.00
Supplies (minimal)	2.00
Estimated Total Cost of the organization of the program	482.00

B. Annual Operating Costs:

% of Salaries - Audiologist (20% of $18,000)	3,600.00
Nurses (1½ hrs./week based on $14,500)	550.00
Supplies:	
Mailing (120 letters/month) (postage, envelopes, secretary time)	1,500.00
Forms (5 forms @ 200/month)	50.00
Additional information distributed (printed brochures)	60.00
Total Annual Operating Costs	$5,760.00

Cost/per live birth= $\frac{\text{Annual operating costs}}{\text{live births}} = \frac{5,760.00}{2,743.00} = \$2.09$

NOTE: These figures are based on estimates made for the Richland Memorial Hospital program, a Level III hospital, in 1982.

SECTION IV: Criteria for Placement on the Registry and Rationale

The criteria listed are based on the criteria recommended by the Joint Committee on Infant Hearing Screening, July 1, 1972 plus additions and adaptations made by Greenville County Hospital and Richland Memorial Hospital. The adaptations and additions are primarily a result of recent research findings and individual hospital staff physicians request. It is extremely important that the physician in charge of newborn nurseries approve the criteria used.

NOTE: The Joint Committee on Infant Hearing Screening met in April, 1981 to revise the criteria and follow-up procedures. The 1972 recommendations stand until the new guidelines are approved by the participating organizations.

CRITERIA USED FOR PLACEMENT OF NEWBORNS ON THE HIGH RISK REGISTRY FOR HEARING IMPAIRMENT

Richland Memorial Hospital Program

Pre-natal Information (collected by Maternal Questionnaire at discharge)

*a. Hereditary Deafness
*b. Maternal Rubella

Post-natal Information (collected by review of medical records)

*a. Defects of the ear, nose or throat (cleft lip or palate, malformed ears, abnormal otoscopic)
*b. Birth weight less than 1200 grams
*c. Bilirubin level greater than:

12 mg/100 ml. for premature infants
16 mg/100 ml. for full term infants

d. Metabolic Acidosis (PH $\leq$ 7.15)
e. Ototoxic Drugs: 7 days (antibiotics, Diuretics)
f. 5 minute APGAR of less than 5
g. Ventilatory therapy greater than 7 days duration
h. Other

The criteria marked with an (*) are the criteria recommended for use by the Joint Committee on Infant Hearing Screening, July 1, 1972. The additional criteria listed were added by Greenville County Hospital and Richland Memorial Hospital.

The levels listed in b and c under Post-natal Information differ slightly from those recommended by the Joint Committee (1972). See rationale for criteria.

Criteria Rationale Statement
High Risk Hearing Registry

The following rationale for inclusion of certain criteria was adopted from Greenville General Hospital, Greenville, South Carolina:

The criteria used for identifying infants is a "combination of recommendations from the Joint Committee and our own. Although the Joint Committee recommends 20mg% for the level of bilirubin it has been suggested by the neonatology faculty of the University of Cincinnati Medical Center that the level recommended is not sufficiently conservative to identify hearing impaired children. Newborns with levels as low as 16mg% also suffer neurotoxicity. Previous research by Keaster, Hyman and Harris has found 4.2% of children with bilirubin concentration of at least 15mg% had mild to severe sensory neuro hearing loss. In 1967, Goodhill recommended the level of 12mg% in normal birthweight infants and 15mg% in premature infants. We also believe that 20mg% is too high and that criteria for term infants should differ from those of the premature, thus our two categories of bilirubin levels.

Recently the Joint Commission has removed birth weight from their criteria. We felt there was insufficient data on this subject and therefore have continued to use this. The low Apgar and acidosis criteria are though to be significantly related to hearing defects. Whether this is related to birthweight or not is unclear at present. Finally the use of potentially ototoxic drugs for prolonged periods of time is commonplace in intensive care nurseries. Thus, this criteria is added in addition to those of the Joint Commission.

NOTE: The recommendations for criteria by the Joint Committee (April 1981) are forthcoming.

SECTION V: Sample Proposal

This proposal was written and submitted as the final draft to the Richland Memorial Hospital administration on March 15, 1979. It outlines the rationale for early identification of hearing loss, the history of newborn hearing screening, and the proposed program in eleven pages. Sample forms, important information and flow charts are included in the appendices. It is important to make the proposal short, concise and yet complete.

Each proposal will be different in order to adapt the program to meet the needs, rules and regulations of each participating hospital.

Initially, a working draft of the proposal should be submitted to key decision makers in the hospital. Based on their feedback and recommendations a final draft may be completed and an implementation date set. It is most important that the information and program plan are clear and concise when presented to the administration. A good organized proposal helps to make a good first impression.

PROJECT SCOOTER
For Hearing Impaired Children
and
THE RICHLAND MEMORIAL HOSPITAL
Speech & Hearing Clinic
Columbia, South Carolina

Proposal for the Implementation of a Newborn High Risk Register For Hearing Impairment

March 15, 1979
Helen Hall, M. S. P. CCC-A
Audiologist, Richland Memorial Hospital

Pamela L. W. Halligan, M. S. CCC-A
Audiologist, Project Scooter

I. Rationale for Early Detection of Hearing Loss

Research has shown that the development of potential speech and language abilities of the hearing impaired are dependent on the age at which the hearing loss is identified (Tervoort, 1964; Lenneberg, 1967). The critical period for the development of language is during the first two years of life (Lenneberg, 1967). Therefore, the longer language stimulation is delayed the lower the prognosis for speech and language facility. For some time professionals in the areas of pediatrics, otolaryngology audiology and speech pathology have maintained that the earliest possible detection of hearing impairment is necessary in order to avoid the permanent psychological, social, educational and communicative problems which accompany severe language delay. The national average for the detection of hearing loss in babies is approximately 2.7 years (Simmons, 1978). This is too late.

According to Northcott (1966) auditory deprivation significantly affects speech development. After reaching the stage of random vocalizations (6-9 months) the hearing impaired child becomes silent because he has no language to imitate. Speech development consequently becomes delayed or does not develop naturally at all.

This proposal offers a screening procedure for detecting perinatal hearing loss in the infant population through the use of a selective high risk registry at Richland Memorial Hospital. The following reasons support the use of high risk data:

1. The incidence of hearing impairment is low (about one in 1000 live births) (Downs, in Bess (Ed.) 1977).

The incidence is particularly high in comparison with other diseases for which screening is more common: PKU (one in 15,000 births); Combined immunodeficiency disease (25 in 3 million); maple syrup urine disease (1 in 300,000); or neonatal hypothyroidism (1 in 6,000 births) (Downs, in Bess (Ed.) 1977). The use of a high risk register is estimated to increase detectability of congenital hearing loss as much as tenfold (Supplementary Statement of Joint Committee, 1972), thereby making it an efficient and reasonable system in terms of time, expenditure and capital outlay.

2. "Seventy to ninety percent of all children who eventually suffer hearing impairment would be listed on a high risk register for newborns." (Downs and Hemenway, 1972).

II. History

There has existed little disagreement that the early identification of hearing impairment is critical and essential for the maximal total development of the child. However, the organization of the detection program itself has undergone many changes.

In 1969 the American Speech and Hearing Association, the American Academy of Ophthalmology and Otolaryngology and the American Academy of Pediatrics established a Joint Committee on Newborn Hearing Screening. After reviewing all available information the committee issued a statement in 1970 saying that, in spite of the urgent need for the early identification of hearing impairment, they "(could) not recommend routine screening of newborn infants" (Conference on Newborn Hearing Screening, 1971) (see Appendix A). The results of the mass screening programs were considered to be "inconsistent and misleading" and

increased research efforts were encouraged.

In 1972, the Joint Committee published a supplementary statement recommending the application of high risk data which "can increase the detectability of congenital hearing impairment perhaps as much as tenfold." (Supplementary Statement of Joint Committee, 1972) (see Appendix B). Infants could be identified as being At Risk for hearing impairment by means of history and physical examination. In 1974, the Joint Committee further recommended the use of a high risk questionnaire containing only five items for evaluation. An arousal test was also recommended to supplement the register.

In 1974, the International Conference on Early Identification of Hearing Loss in Nova Scotia reviewed and reaffirmed the five criteria listed in the high risk registry. The Nova Scotia Conference added to the Joint Committee's recommendations by urging national and local governments to mandate legally the suggested program so as to establish a "uniform and universal procedure."

Since 1977 Richland Memorial Hospital has conducted a routine hearing screening program for infants in the Neonatal Intensive Care Unit. The staff audiologist would test each infant found to be positive for certain high risk criteria for hearing impairment by using an arousal test with a Phonic Ear Warblet. (see Appendix C). The names of the infants who failed the screening were forwarded to the child's pediatrician with recommendations for further indepth testing (sources for evaluations were provided). Recent analysis of the system showed that although many conditions associated with possible congenital

hearing impairment are covered in the current screening, two very important criteria are not considered: family history of hearing impairment and, at times, maternal rubella. Summary reports from existing high risk screening programs cite family history as the most sensitive criteria for the detection of hearing loss, followed by maternal rubella (Summary Report, Utah, 1977; Summary Information, Greenville, S. C., 1978). Also, it became evident that follow-up of identified infants after being referred to the child's pediatrician had been inconsistent; consequently, most infants identified as At Risk were lost after leaving the hospital. The present proposal seeks to expand Richland Memorial Hospital's high risk screening program to cover the two criteria previously cited and to provide a plan for efficient and continuous follow-up.

In response to the need for the earliest possible identification of hearing impairment, Project Scooter for Hearing Impaired Children at the University of South Carolina seeks to aid in establishing a newborn high risk hearing registry in cooperation with Richland Memorial Hospital. Project Scooter (South Carolina Open Option Teaching for Early Readiness) is a model demonstration program for the early identification and education of hearing impaired children (birth to four years). The University of South Carolina was awarded a grant from USOE-Bureau of Education of the Handicapped in July, 1977. One of the primary goals of the project is to aid in the establishment of a model early identification program in the Columbia - Midlands region which later can be replicated in other areas of the state. Richland Memorial Hospital appears to be the ideal site for a pilot high risk screening program for the Midlands region because:

1. the hospital already has demonstrated support for early screening for hearing impairment as evidenced by the Neonatal Intensive Care Unit hearing screening program presently in progress;
2. a full time audiologist is on the hospital staff, and
3. the Intensive Care Unit for the Midlands Region is located at Richland Memorial; therefore a large population of infants potentially at risk for hearing impairment is accessible.

Project Scooter is also the only comprehensive preschool program for hearing impaired children in South Carolina. Consequently, infants identified through the proposed high risk program could be referred for immediate educational intervention and follow-up.

Presently there exists only one functioning newborn high risk hearing registry program in South Carolina: The Newborn Hearing Screening Program in Greenville County. The program was implemented in April 1978 through the cooperative efforts of the School District of Greenville County and the Greenville Hospital system. (see Appendix D). The Greenville program was designed to employ the high risk registry published by the Joint Committee on Infant Hearing Screening to research the following points:

1. "To determine the incidence of hearing impairment among children considered At Risk according to the supplementary study."
2. To assess "the ability of the high risk registry to identify children with hearing impairment."

3. To "determine whether certain of the criterion are more sensitive in identifying hearing impaired children or whether certain of the criterion are not sensitive in establishing the proper identification." (Proposal, 1977)

Certain components of the Greenville Newborn High Risk Screening Program may be used at Richland Memorial Hospital. These include the high risk criteria for evaluation, the procedure for follow-up testing and the maternal questionnaire. It appears that other areas of South Carolina may institute high risk screening for hearing impairment. It would be advantageous and economical for all programs to adopt the same or similar components. Use of the above stated components in Richland County would encourage the the development of consistent statewide programming which would facilitate research in the area of neonatal hearing screening. Of course, the program design must be flexible enough to allow for adaptation to meet the unique needs and policies of the hospital and community.

III. The Proposed Program (see Appendix E)

Criteria: The same criteria used by the Newborn High Risk Hearing Registry Program in Greenville, South Carolina will be used for the detection of infants At Risk for hearing impairment at Richland Memorial Hospital. The criteria used will include the following:

Pre-natal information

a. Hereditary Deafness

b. Maternal Rubella

Post-natal information

a. Defects of the ear, nose or throat

(cleft lip or palate, malformed ears, abnormal otoscopic)

b. Birth weight less than 1200 grams

c. Bilirubin level greater than:

-12 mg/100 ml. for premature infants

-16 mg/100 ml. for full term infants

d. Metabolic Acidosis (PH≤ 7.15)

e. Ototoxic Drugs: 7 days (antibiotics, Diuretics)

f. 5 minute APGAR of less than 5

The following criteria will be added by request of Richland Memorial staff physicians:

g. Ventilatory therapy greater than seven (7) days duration

h. Other

Collection of Pertinent Information: The Hearing Screening Questionnaire form will be placed in the charts of all infants in the Intensive Care Unit. (see Appendix F) Nursing personnel will administer the maternal questionnaire (questions 1-3 of the Hearing Screening Questionnaire) to the mothers of the NICU infants All other mothers will answer the same questions as part of discharge procedures. Assigned nursing personnel will fill out the form at that time. The audiologist will collect the completed questionnaires and she or some other designated employee will review the medical records of all newborn infants to answer the questions pertaining to the criteria under post natal information listed above (the back portion of the Hearing Screening Questionnaire, Appendix F).

Determination of Infant Status: After all information is obtained and reviewed the audiologist will determine which infants are At Risk for hearing impairment. Any child having a positive score for any one of the listed criteria will be listed on the high risk registry. All babies determined to be not At Risk are not followed.

The High Risk Registry file will be kept and maintained by the staff audiologist in the Speech and Hearing Clinic at Richland Memorial Hospital.

Initial Audiological Examination: All infants in the Neonatal Intensive Care Unit will also receive the intial newborn audiological examination before he leaves the hospital nursery. The procedure for testing will include startle response audiometry using a Phonic Ear Warblet following guidelines described by Downs, (1971). (These procedures are currently used in the existing screening program at Richland Memorial Hospital.) This additional screening procedure will be performed for a trial period of 6 months. At the end of that time the procedure will be assessed to determine whether it should be continued as part of the high risk screening program.

Notification of Parent(s) and Pediatricians: As soon as possible after leaving the hospital the parent(s) of infants listed on the high risk registry will be notified by letter of their child's status and that he should be scheduled for further testing. (see Appendix G). Information about hearing and auditory development provided by the S. C. Department of Health and Environmental Control will also be included. (see Appendix H). Each child's pediatrician will be notified as soon as possible that the infant is listed on the high risk registry for hearing impairment. This

information will be communicated by letter to his office along with a list of available sources for complete audiological assessment. (see Appendix I).

Six Month Audiological Evaluation: An indepth audiological evaluation at 6 months of age is strongly recommended for each infant At Risk. However, particular observation during the first months of life is also warranted for all children who were in the Intensive Care Unit and failed both the Hearing Screening Questionnaire and the initial audiological examination. The results of the arousal test in the newborn nursery are particularly advantageous for the identification of severe to profound deafness (Northern and Downs, 1978). The family and the child's physician may chose from the list of clinics with proper facilities for pediatric testing for the evaluation. The guidelines for the six month evaluation will follow the Greenville recommendation which states:

> "An interval history should be taken. Audiological examination should include localization audiometry using narrow band noise and speech while employing conditioned orientation response techniques to reinforce behavior. In addition, impedance measurements should be taken. The impedance measurements should include estimates of acoustic compliance of the ear, tympanometry and stapedial reflex threshold..... All testing for 6.... month old children should be done under free field conditions using the audiometer speakers." (Proposal, 1977)

Babies who pass the sixth month hearing evaluation should be re-scheduled for a follow-up evaluation at 12 months of age.

This precaution follows the recommendations made by the Joint Committee on Infant Hearing Screening in their Supplementary Statement (1972) to help detect familial hearing impairment that may develop at an uncertain time after birth. All infants who do not pass may be immediately referred to Project Scooter for educational intervention and complete audiological management. Each child will also be referred for an otological examination if they have not been previously medically cleared.

Cooperative Agreements: The clinic performing the 6 month audiological evaluation will forward copies of evaluation reports and follow-up recommendations to Richland Memorial Hospital High Risk Registry Program.

Numerical data concerning incidence figures and criteria sensitivity will be shared with Project Scooter and the Greenville Newborn High Risk Screening Program for purposes of research and program assessment.

If the family of a child listed on the High Risk Register moves to Greenville County the name of that child will be transferred to the Greenville County High Risk Registry Program for follow-up. Likewise, the name of any child listed on the Greenville registry would be transferred to the Richland Memorial Hospital Program if his family moves into any one of the counties served by the hospital.

Conclusion: In summary, the proposed program offered herein is expected to provide a more efficient system for the detection of congenital sensori neural hearing impairment in newborns. More thorough and adequate follow-up than is presently obtained

through the existing program at Richland Memorial Hospital would also be obtained. The early detection and continual educational intervention during the critical first years of life for both child and family will help to minimize the severe developmental delay, especially in communication skills, that otherwise would occur.

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JOINT COMMITTEE STATEMENT
ON INFANT HEARING SCREENING

A common concern with the current status of screening procedures for hearing impairment among the newborn infants led to the formation of a Joint Committee comprised of respresentatives of the American Academy of Ophthalmology and Otolaryngology, the American Speech and Hearing Association. After due consideration of infant hearing screening, this Joint Committee developed the following statement which has been endorsed by all three societies represented on the Committee.

STATEMENT ON NEONATAL SCREENING FOR HEARING IMPAIRMENT

In recognition of the need to identify hearing impairment as early in life as possible, auditory screening programs have been implemented in newborn nurseries throughout the country. Review of data from the limited number of controlled studies which have been reported to date has convinced us that results of mass screening programs are inconsistent and misleading.

To determine whether mass screening programs for newborn infants should indeed be instituted, intensive study of a number of variables is essential. These should include stimuli, response patterns, environmental factors, status at the time of testing, and behavior of observers. Furthermore, confirmation of results obtained in the nursery must await data derived from extended follow up studies which involve quantitative assessment of hearing status.

In view of the above considerations and despite our recognition of the urgent need for early detection of hearing impairment, we urge increased research efforts, but cannot recommend routine screening of newborn infants for hearing impairment.

November 1970

American Academy of Ophthalmology and Otolaryngology

American Academy of Pediatrics

American Speech and Hearing Association

The American Speech and Hearing Association was represented on the Committee by the following members: Arthur J. Derbyshire, Sanford E. Gerber, Irving Shapiro, and Marion P. Downs, Chairman.

SUPPLEMENTARY STATEMENT OF JOINT COMMITTEE ON INFANT HEARING SCREEING

July 1, 1972

In light of the urgent need to detect Hearing Impairment as early as possible, a 1970 statement of the Joint Committee urged further investigation of screening methods but discouraged routine hearing screening which is not research oriented. In consonance with that statement, and in view of the information that application of high risk data can increase the detectability of congenital hearing impairment perhaps as much as tenfold, the committee considers it appropriate to make additions to the 1970 statement.

The Committee recommends that, since no satisfactory technique is yet established that will permit hearing screening of all newborns, infants At Risk for hearing impairment should be identified by means of history and physical examination. These children should be tested and followed up as hereafter described:

I. The criterion for identifying a newborn as At Risk for Hearing Impairment is the presence of one or more of the following:

   a. History of hereditary childhood hearing imparment.

   b. Rubella or other non-bacterial intra-uterine fetal infection (e.g., cytomegalovirus infections, Herpes infection).

   c. Defects of ear, nose, or throat. Malformed, low-set or absent pinnae; cleft lip or palate (including sub-mueous cleft); any residual abnormality of the otorhinolaryngeal system.

   d. Birthweight less than 1,500 grams.

   e. Bilirubin level greater than 20 mg./100 ml. serum.

II. Infants falling in this category should be referred for an indepth audiological evaluation of hearing during their first two months of life and, even if hearing appears to be normal, should receive regular hearing evaluations thereafter at office or well-baby clinics. Regular evaluation is important since familial hearing impairment is not necessarily present at birth but may develop at an uncertain period of time later.

Criteria for Newborn Infant Screening Program
Richland Memorial Hospital
Established December 29, 1976

A. History of hereditary childhood hearing impairment.

B. Rubella or other non-bacterial intrauterine fetal infection (e.g. Cyto megalovirus infections, Herpes infection).

C. Defects of ear, nose, or throat. Malformed, low set or absent pinnal; cleft lip or palate including submucouscleft), any residual abnormality of the otorhinolaryngeal system.

D. Birth weight less than 1500 grams.

E. Bilirubin level greater than 20 m.g./100 ml. for term infants, and 15 for preterm infants.

F. Exposure to ototoxic drugs.

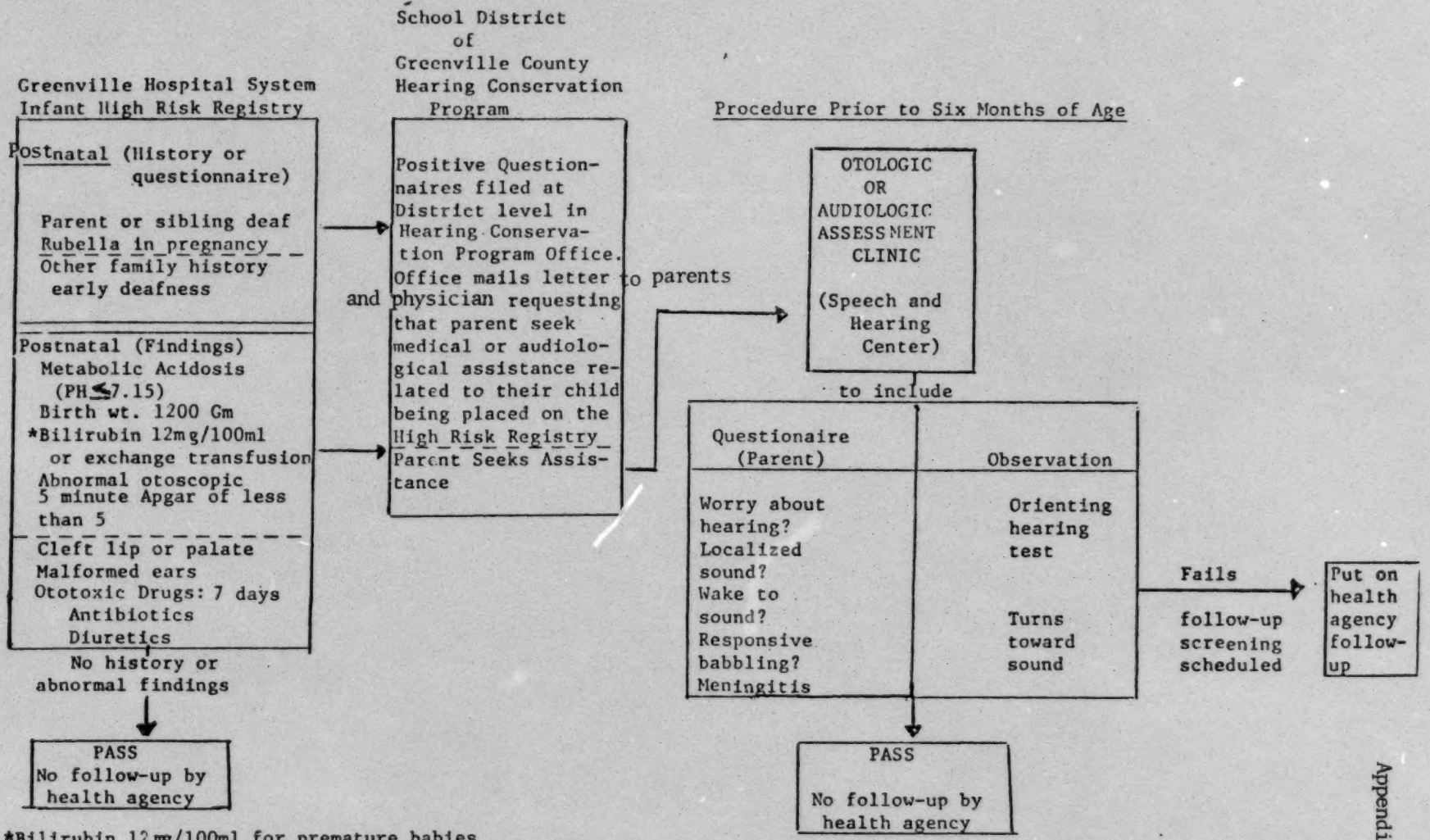
G. Ventilatory therapy greater than seven days duration.

H. Prolonged hypoxia.

I. Apgar below six.

THE SCHOOL DISTRICT OF GREENVILLE COUNTY HEARING CONSERVATION PROGRAM

(Suggested Flow Chart for Newborn Hearing Screening Program With Follow-up)


Greenville Hospital System
Infant High Risk Registry
Postnatal (History or questionnaire)
Parent or sibling deaf
Rubella in pregnancy
Other family history early deafness
Postnatal (Findings)
Metabolic Acidosis (PH ≤ 7.15)
Birth wt. 1200 Gm
*Bilirubin 12mg/100ml or exchange transfusion
Abnormal otoscopic
5 minute Apgar of less than 5
Cleft lip or palate
Malformed ears
Ototoxic Drugs: 7 days
Antibiotics
Diuretics
No history or abnormal findings
PASS
No follow-up by health agency
School District of Greenville County Hearing Conservation Program
Positive Questionnaires filed at District level in Hearing Conservation Program Office.
Office mails letter to parents and physician requesting that parent seek medical or audiological assistance related to their child being placed on the High Risk Registry
Parent Seeks Assistance
Procedure Prior to Six Months of Age
OTOLOGIC OR AUDIOLOGIC ASSESSMENT CLINIC
(Speech and Hearing Center)
to include
Questionaire (Parent)
Observation
Worry about hearing?
Localized sound?
Wake to sound?
Responsive babbling?
Meningitis
Orienting hearing test
Turns toward sound
Fails
follow-up screening scheduled
Put on health agency follow-up
PASS
No follow-up by health agency

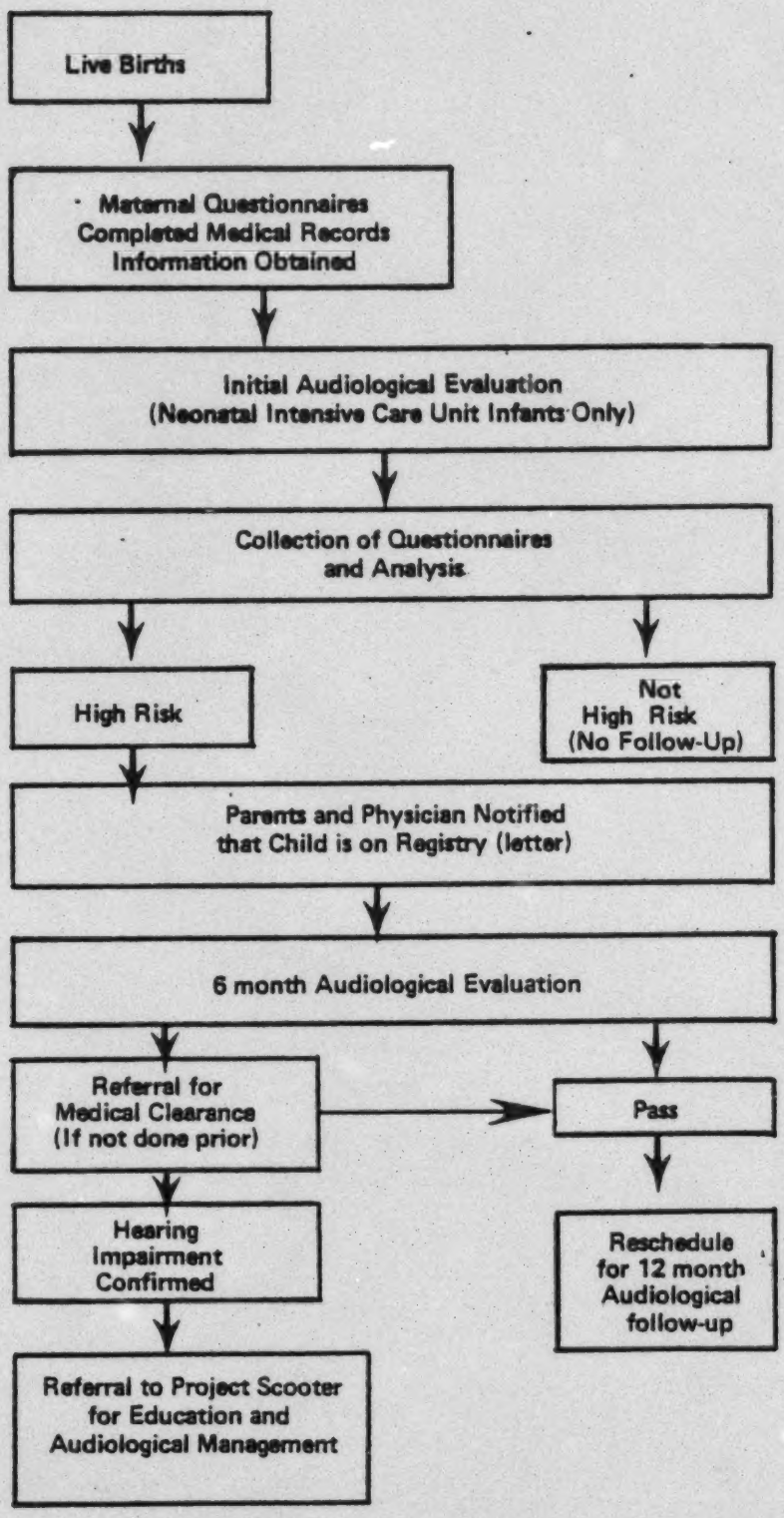
*Bilirubin 12 mg/100ml for premature babies
*Bilirubin 16 mg/100ml for full term babies

(33)

Appendix D

APPENDIX E

SUGGESTED FLOW CHART
For
NEWBORN HIGH RISK HEARING SCREENING PROGRAM
And Follow Up
RICHLAND MEMORIAL HOSPITAL
Columbia, South Carolina



RICHLAND MEMORIAL HOSPITAL
HEARING SCREENING QUESTIONNAIRE

1. Do you know any of your baby's relatives who could not hear well before they were 50 years of age? Think hard about all of your family and the baby's father's family. YES ___ NO ___
   a. If No, go to question 2.
   b. If Yes, please answer these questions:
      1. Who were they? (Relationship to baby) _____
      2. How old (about) are they now? _____
      3. How old were they when the hearing loss occurred? _____
      4. Did he/she always speak clearly? Yes ___ No ___
      5. Did the relative ever have a hearing aid? Yes ___ No ___
      6. Did the relative ever have surgery for the hearing problem? Yes ___ No ___
      7. Was the cause of the relative's hearing loss ever diagnosed or identified by a doctor? Yes ___ No ___
         Do you know what it was? _____
2. During your pregnancy, did you have Three-day measles, German Measles, Rubella, or a rash with a fever? YES ___ NO ___
   a. If Yes, at what time in your pregnancy? _____
3. Do you have any reason to think that your child may have a hearing loss? YES ___ NO ___
   a. If Yes, why? _____

I give my consent for the release of this information to hospital audiologist for use in the Hearing Survey.

Parent's Signature _____

Address _____

_____

Phone Number _____

Pediatrician _____

_____ a. Defect of ear, nose, or throat (cleft lip or palate, malformed ears, abnormal otoscopic)

_____ b. Birth weight less than 1200 grams

_____ c. Bilirubin level greater than: -12 mg/100 ml. for premature infants
-16 mg/100 ml. for full term infants

_____ d. Metabolic acidosis (PH≤7.15)

_____ e. Ototoxic Drugs: 7 day (antibiotics, diuretics)

_____ f. 5 minute APGAR of less than 5

_____ g. Ventilatory therapy greater than seven days duration

_____ h. Other _____

RMH RICHLAND MEMORIAL HOSPITAL

3301 HARDEN STREET, COLUMBIA, S C 29203 TELEPHONE (803) 765-7011

Name of Child: _____

Dear Parent:

Richland Memorial Hospital is conducting a program to identify newborn children with possible hearing difficulty. Such children are identified through an evaluation of family history and a physical examination at birth. Your child has been identified as needing further hearing tests. Therefore, we recommend that you obtain medical or audiological (hearing evaluation) attention.

Please schedule an appointment for your child with the physician or audiologist of your choice. When you do so, take the enclosed card to your appointment and request the findings be mailed to Speech and Hearing, High Risk Registry Program, Richland Memorial Hospital. Hopefully, the use of the hearing registry will enable early educational assistance for children found to have hearing difficulty.

Sincerely,

Tom Austin, M.D.

Tom L. Austin, M.D., Director,
Division of Neonatology

Helen M. Hall, M.S.P

Helen M. Hall, M.S.P.
Audiologist, C.C.C.

Date: _____

To be filled out by physician and returned to Speech and Hearing, High Risk Registry Program, Richland Memorial Hospital.

Name of Child _____
First Middle Last

Name of Physician _____

Address of Physician _____

Did your examination confirm the presence of a hearing loss? Yes ( ) No ( )

Will he receive medical treatment in an attempt to eliminate the hearing loss? Yes ( ) No ( )

Will he receive medical treatment in an attempt to eliminate the hearing loss? Yes ( ) No ( )

What is the prognosis? temporary ( ) permanent ( ) stable ( ) progressive ( ) fluctuating ( ) Other ( )

Comments:

TO BE TYPED ON CARD

42

SPEECH and HEARING checklist

This checklist outlines behavior which may be expected of a child at various age levels. If he consistently fails to respond as the checklist suggests, he may have a problem which requires further evaluation.

AVERAGE AGE	QUESTION	AVERAGE BEHAVIOR
3-6 Months	What does he do when you talk to him?	He awakens or quiets to the sound of his mother's voice.
	Does he react to your voice even when he cannot see you?	He typically turns eyes and head in the direction of the source of sound.
7-10 Months	When he can't see what is happening, what does he do when he hears familiar footsteps . . . the dog barking . . . the telephone ringing . . . candy paper rattling . . . someone's voice . . . his own name?	He turns his head and shoulders toward familiar sounds, even when he cannot see what is happening. Such sounds do not have to be loud to cause him to respond.
11-15 Months	Can he point to or find familiar objects or people, when he is asked to? *Example* "Where is Jimmy?" "Find the ball."	He shows his understanding of some words by appropriate behavior; for example, he points to or looks at familiar objects or people, on request.
	Does he respond differently to different sounds?	He jabbers in response to a human voice, is apt to cry when there is thunder, or may frown when he is scolded.
	Does he enjoy listening to some sounds and imitating them?	Imitation indicates that he can hear the sounds and match them with his own sound production.
1½ years	Can he point to parts of his body when you ask him to? *Example* "Show me your eyes." "Show me your nose."	Some children begin to identify parts of the body. He should be able to show his nose or eyes.
	How many understandable words does he use—words you are sure *really* mean something?	He should be using a few single words. They are not complete or pronounced perfectly but are clearly meaningful.
2 years	Can he follow simple verbal commands when you are careful not to give him any help, such as looking at the object or pointing in the right direction? *Example* "Johnny, get your hat and give it to daddy." "Debby, bring me your ball."	He should be able to follow a few simple commands without visual clues.
	Does he enjoy being read to? Does he point out pictures of familiar objects in a book when asked to? *Example* "Show me the baby." "Where's the rabbit?"	Most 2-year-olds enjoy being "read to" and shown simple pictures in a book or magazine, and will point out pictures when you ask them to.
	Does he use the names of familiar people, and things such as *Mommy, milk, ball,* and *hat*?	He should be using a variety of everyday words heard in his home and neighborhood.
	What does he call himself?	He refers to himself by name.
	Is he beginning to show interest in the sound of radio or TV commercials?	Many 2-year-olds do show such interest, by word or action.
	Is he putting a few words together to make little "sentences"? *Example* "Go bye-bye car." "Milk all gone."	These "sentences" are not usually complete or grammatically correct.

OVER ►

This checklist, prepared by Mary Wootton Masland, M.A., is reprinted from the January 1970 *Volta Review*, journal of the Alexander Graham Bell Association for the Deaf, 3417 Volta Place, N.W., Washington, D. C. 20007. Copyright © 1970 Alexander Graham Bell Association for the Deaf.

AVERAGE AGE	QUESTION	AVERAGE BEHAVIOR
2½ years	Does he know a few rhymes or songs? Does he enjoy hearing them?	Many children can say or sing short rhymes or songs and enjoy listening to records or to mother singing
	What does he do when the ice cream man's bell rings out of his sight—or when a car door or house door closes at a time when someone in the family usually comes home?	If a child has good hearing, and these are events that bring him pleasure, he usually reacts to the sound by running to look or telling someone what he hears.
3 years	Can he show that he understands the meaning of some words besides the names of things? *Example* "Make the car go." "Give me the ball." "Put the block in your pocket." "Find the big doll."	He should be able to understand and use some simple verbs, pronouns, prepositions, and adjectives, such as *go, me, in,* and *big.*
	Can he find you when you call him from another room?	He should be able to locate the source of a sound.
	Does he sometimes use complete sentences?	He should be using complete sentences some of the time.
4 years	Can he tell about events that have happened recently?	He should be able to give a connected account of some recent experiences.
	Can he carry out two directions, one after the other? *Example* "Bobby, find Susie and tell her dinner's ready."	He should be able to carry out a sequence of two simple directions.
5 years	Do neighbors and others outside the family understand most of what he says?	His speech should be intelligible, although some sounds may still be mispronounced.
	Can he carry on a conversation with other children or familiar grown-ups?	Most children of this age can carry on a conversation if the vocabulary is within their experience.
	Does he begin a sentence with "I" instead of "me"; "he" instead of "him"?	He should use some pronouns correctly.
	Is his grammar almost as good as his parents'?	Most of the time, it should match the patterns of grammar used by the adults of his family and neighborhood.

CHECKLIST

Startled by loud sounds Soothed by mother's voice	**birth to 3 months**
Turns eyes and head to search for location of sound Responds to mother's voice Imitates his own noises — oohs, ba ba's, etc. Enjoys rattles and other sound making toys	**3 to 6 months**
Responds to his own name, telephone ringing, and someone's voice even when not loud Understands "no", "bye-bye" and other common words	**6 to 10 months**
Can point to or look at familiar objects or people when asked to do so Imitates simple words and sounds	**10 to 15 months**
Follows simple spoken directions First words are well on their way By 18 months there should be many more words!	**15 to 18 months**

KEEP THIS CARD

Can Your Baby Hear?

Your child's most important learning will take place between birth and 4 years of age.

In the first four years of life, the child learns how to communicate — first to understand what people say, and then to start talking himself. To do this, **your baby must have usable hearing.**

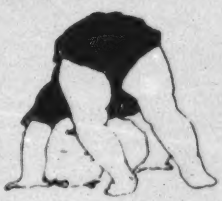
You can do some simple tests to find out if your baby has normal hearing, provided you know what to look for. The information here is a basic guide. As the weeks and months go by, check to see if your baby can do most of the things listed. **If he can't, don't wait.** He may have a hearing problem.

If you suspect that your baby has a hearing problem, **tell your doctor immediately.** If the doctor cannot accurately test your child, contact your local hearing and speech clinic. Your baby's hearing can be tested at any age. It is vital that a child with impaired hearing receive proper medical help and whatever special training is needed, as early as possible.

HEARING ALERT!

a program of

© 1979
Alexander Graham Bell
Association for the Deaf
3417 Volta Place, N.W.
Washington, D.C. 20007
Phone (202) 337-5220



RMH RICHLAND MEMORIAL HOSPITAL

3301 HARDEN STREET, COLUMBIA, S C 29203 TELEPHONE (803) 765-7011

Dear Doctor:

The Hearing Survey Questionnaire for _____ showed that:

_____ Child has a history of deafness in the family;

_____ Mother possibly had Rubella during her pregnancy;

_____ Parents are concerned their child may have a hearing loss;

_____ Child had a bilirubin above 16;

_____ Child had external ear anomolies.

Special Care Nursery

_____ Bilirubin above 12;

_____ Cleft lip - cleft palate;

_____ Low birth weight (< 1200 grams);

_____ Ototoxic drugs for at least 7 days;

_____ Five minute Apgar ≤ 5;

_____ Metabolic Acidosis (pH ≤ 7.15)

_____ Ventilatory therapy > 7 days duration

_____ Other _____

Because of the above, we have entered the infant in the High Risk Registry. This program is for screening purposes. It will detect 75-90% of all children with congenital hearing loss. Congenital hearing deficits occur in at least 1 in every 1000 deliveries.

We appreciate your cooperation.

Sincerely,

Tom Austin, M.D.
Tom L. Austin, M.D.
Director, Division of Neonatology

Helen M. Hall, M.S.P.
Helen M. Hall, M.S.P.
Audiologist, C.C.C.

Name of Child _____

Parents _____

(See Reverse Side)

In addition to medical diagnosis we recommend audiological testing at 6 months of age to include the following:

1. Localization audiometry in free field using narrow band noise and speech while employing conditioned orientation response techniques to reinforce behavior.
2. Impedance measurements (acoustic compliance of the ear, tympanometry, stapedial reflex threshold comparison).

The following clinics have indicated they have the proper facilities for testing:

Anderson, Bill, Audiologist
Davidson, Salley B., Audiologist
Hearing and Speech Center
1800 Main Street
Columbia, SC 29203
252-0303

Baily, Cindy, Audiologist
Jenkins, Sharon, Audiologist
Speech and Hearing Clinic
South Carolina State College
Orangeburg, SC 29117

Bogo, Helena, Audiologist
Drs. Haile and Warder
1707 Brabham Avenue
Columbia, SC 29204
256-7076

Dempsey, Bonnie, Audiologist
Williamsburg Nursing Center
1018 N. Guignard
Sumter, SC 29150

Hall, Helen, Audiologist
Speech and Hearing Services
Richland Memorial Hospital
3301 Harden Street
Columbia, SC 29203
765-6553

Halligan, Pamela, Audiologist
Project Scooter (free of charge)
University of South Carolina
Columbia, SC 29203
777-7876

Leadbitter, Beth, Audiologist
Midland Ear Nose and Throat
Clinic, P.A.
3321 Medical Park Road
Columbia, SC 29203
254-2495

Murray, Pat, Audiologist
Columbia Ear Nose and Throat
Associates
1639 Brabham Avenue
Columbia, SC 29204
254-2483

Wilde, Graham, Capt., Audiologist
Audiology Clinic
Moncrief Army Hospital
Ft. Jackson, SC 29207
751-2438, 751-5406

All children in South Carolina suspected of having a hearing problem are eligible for free diagnostic hearing evaluations through the Crippled Children's program. Application may be made through the county health department of the parent's resident.

Hearing evaluation is also a covered service of the Medicaid program.

SECTION VI: Sample Information Letter to Physicians

All physicians (pediatricians, family practice, otolaryngologists) in the counties served by the hospital should receive an information letter describing the program and a proposed implementation date. It is critical that these physicians be well informed as to the purpose and function of the program because they play a key role in assuring good follow-up on each child determined to be "at risk" for hearing impairment. (See flow chart in sample proposal) This bulk mail-out should occur well before program implementation.

Please note that the sample letter is signed by the Director of Neonatology at the hospital as well as the audiologist. It is an advantage to make hospital staff physician support visible. Information regarding rationale for identification, a brief summary of the program, a flow chart and the criteria to be used are included with the letter. A brochure or information about local preschool hearing impaired programs should also be included.

RMH RICHLAND MEMORIAL HOSPITAL

3301 HARDEN STREET, COLUMBIA, S. C. 29203 TELEPHONE (803) 765-7011

May 7, 1979

Dear Doctor:

The purpose of this letter is to provide information to physicians in the 17 county area served by Richland Memorial Hospital. Enclosed is a flow chart and summary of the High Risk Registry Program for the detection of perinatal hearing impairment scheduled to begin in May, 1979 at Richland Memorial Hospital.

This program has been under design for approximately seven months through the cooperative efforts of Project SCOOTER for Hearing Impaired Children at the University of South Carolina (see enclosed brochure) and Richland Memorial Hospital Speech and Hearing Department. It is hoped that through the use of this register a large percentage of children "AT Risk" for hearing impairment will be detected and channeled immediately into an appropriate preschool educational program. Such early intervention is critical in order to prevent severe developmental delay in communicative development and in other areas of learning.

Nursing personnel at the hospital are currently being briefed concerning the content and administration of the Hearing Screening Questionnaire so that they may be of assistance to the mothers.

After the program has begun you may expect to be notified each time one of your patients is listed on the registry. Available sources for indepth audiological evaluations will be provided. The parents will also receive notification by letter. Hopefully, this summary and flow diagram will help you in answering any questions the parents may have about the High Risk Register. You may wish to assure them that it is a screening measure - like the PKU test.

If after reviewing this information you have further questions, please do not hesitate to call 765-6553.

Sincerely,

Tom Austin, MD

Tom L. Austin, M.D., Director
Division of Neonatology

Helen Hall

Ms. Helen Hall, M.S.P., CCC-A
Audiologist

Although hearing impairment is a relatively low incidence handicap (1/1,000 live births, (Downs, in Bess(Ed.) 1977)), the possible resultant severe developmental delay particularly in the area of speech and language makes its early detection critical.

The use of a High Risk Registry in lieu of mass screening is the recommended screening procedure for the detection of perinatal hearing impairment suggested by the Joint Committee on Newborn Hearing Screening in their Supplementary Statement issued in 1972. The Joint Committee concluded that:

- Infants can be identified as being "At Risk"for hearing impairment by means of history and physical examination.
- A high risk questionnaire containing only five items for evaluation was recommended for use.
- The use of a high risk register is estimated to increase detectability of congenital hearing loss as much as tenfold.

Downs and Hemenway, 1972, further state that seventy to ninety percent of all children who eventually suffer hearing impairment would be listed on a high risk register for newborns.

The program at Richland Memorial Hospital will be the second of its kind in the state; the first program has been operating since April, 1978 at Greenville General Hospital in Greenville, South Carolina. Several other areas of the state have also expressed interest in implementing such a program.

SUMMARY OF THE HIGH RISK REGISTRY PROGRAM
FOR PERINATAL HEARING IMPAIRMENT
RICHLAND MEMORIAL HOSPITAL

The Richland Memorial Hospital High Risk Registry Program for the detection of perinatal hearing impairment will use the five criteria for evaluation recommended by the Joint Committee on Newborn Hearing Screening (1972) with several additions (see criteria). Any positive answer to any one of the conditions listed places the infant on the high risk register. In addition, all infants in the NICU will automatically be placed on the register and receive an initial hearing test in the newborn nursery. The test will follow the guidelines described by Downs(1971) using a Phonic Ear Warblet to elicit arousal responses. This initial hearing test procedure will be included in the program for a trial period of six months.

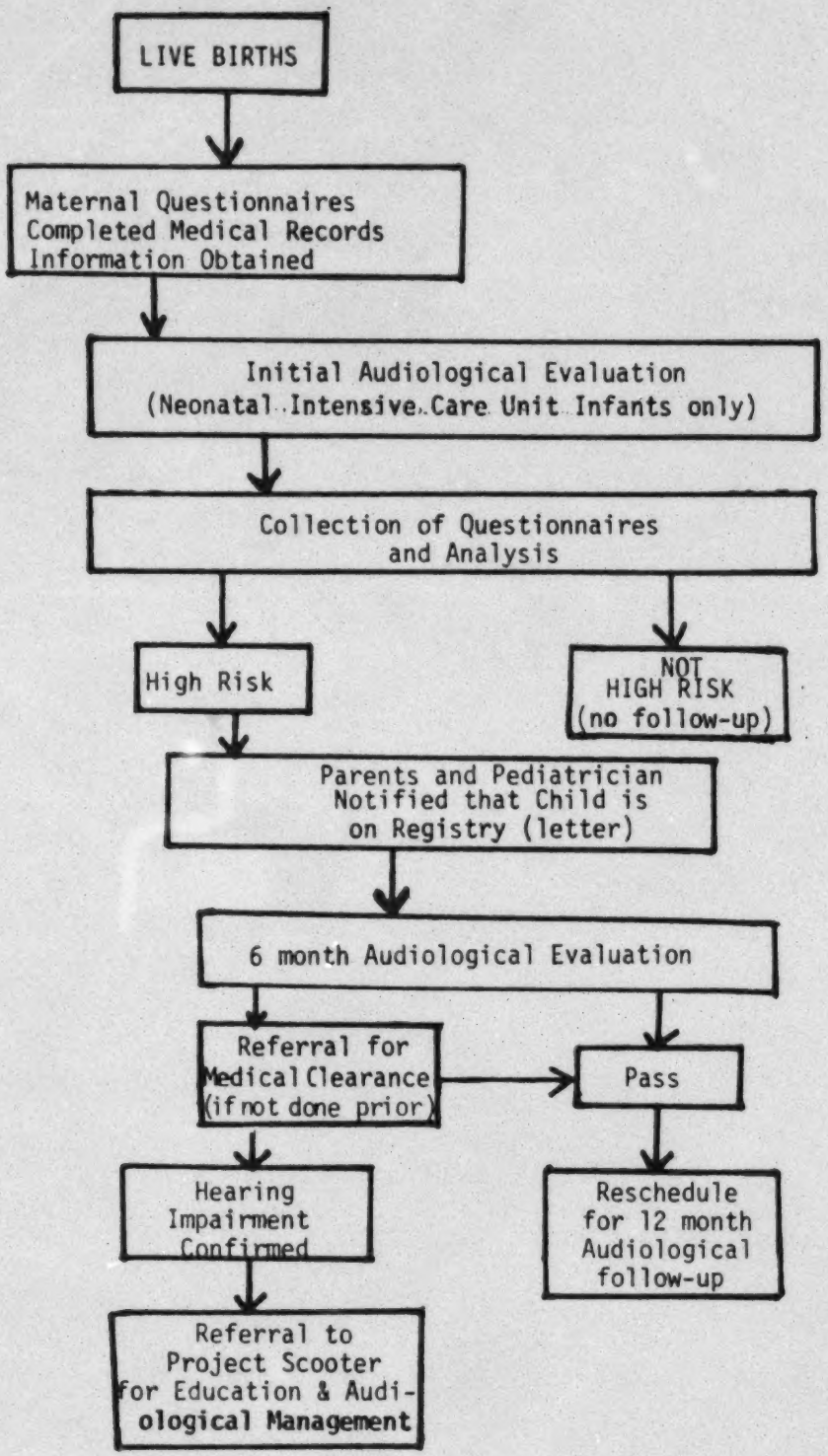
The hospital audiologist, Ms. Helen Hall, will coordinate the high risk program. A file on every child identified as high risk for hearing impairment will be maintained in the Speech and Hearing Department of Richland Memorial Hospital.

The Hearing Screening Questionnaires will be filled out before the infant goes home and both the parents and pediatrician will be notified as soon as possible if the child is entered on the registry.

In order to monitor each infant carefully the program recommends a six month old indepth audiological evaluation for each child. Specific procedures and equipment are necessary and a list of available sources for the testing will be forwarded to each physician. Free evaluation sources and third party sources will be indicated. As part of the six month evaluation each child should be medically cleared for any treatable hearing problems. It is important that all infants who pass the six month evaluation be retested at 12 months of age in order to detect any progressive losses that may have occurred in the interim.

It is requested that copies of audiometric reports and notification of medical clearance be forwarded to the High Risk Registry Program for record maintenance. Any infant determined to have a hearing loss may be referred for free educational services and audiological management to Project SCOOTER for Hearing Impaired Children at the University of South Carolina in Columbia.

SUGGESTED FLOW CHART
For
NEWBORN HIGH RISK HEARING SCREENING PROGRAM
And Follow Up
RICHLAND MEMORIAL HOSPITAL
Columbia, South Carolina



CRITERIA USED FOR PLACEMENT OF NEWBORNS ON THE HIGH RISK REGISTRY FOR HEARING IMPAIRMENT

Richland Memorial Hospital ...gram

Pre-natal Information (collected by Maternal Questionnaire at discharge)

*a. Hereditary Deafness
*b. Maternal Rubella

Post-natal Information (collected by review of medical records)

*a. Defects of the ear, nose or throat (cleft lip or palate, malformed ears, abnormal otoscopic)
*b. Birth weight less than 1200 grams
*c. Bilirubin level greater than:

12 mg/100 ml. for premature infants
16 mg/100 ml. for full term infants

d. Metabolic Acidosis (PH $\leq$ 7.15)
e. Ototoxic Drugs: 7 days (antibiotics, Diuretics)
f. 5 minute APGAR of less than 5
g. Ventilatory therapy greater than 7 days duration
h. Other

The criteria marked with an (*) are the criteria recommended for use by the Joint Committee on Infant Hearing Screening, July 1, 1972. The additional criteria listed were added by Greenville County Hospital and Richland Memorial Hospital.

SECTION VII: Sample Information for the Audiologist

Part of the success of the program will be a result of good in-service training for the different professional groups who contribute to the follow-up of each child. These groups include not only physicians in otolaryngology, pediatrics and family practice but also audiologists and nurses in the area served by the hospital. These key people need to know not only what the program is all about but also what is expected of them. Their responsibilities must be defined.

The sample information packet for audiologists provides guidelines for the testing and referral of children who go through the program. A brochure of information about local programs for preschool hearing impaired children should also be included.

NOTES FOR THE AUDIOLOGIST

The audiologist and the pediatrician are the key professionals in insuring efficient and complete follow-up for all children on the High Risk Registry for hearing impairment.

The essential areas in the flow of the program for the audiologist are the 6 month and 12 month audiological evaluations. Based on his/her assessments and referrals infants will be channeled into the next stage of follow-up.

Everyone listed on the attached sheet indicated that they have appropriate facilities for testing 6 month old infants and provide services in the 17 county area served by Richland Memorial Hospital.

Also attached is a suggested guideline for the audiological evaluation of 6 month old infants. The 12 month evaluation is essentially the same. Any additions are encouraged (e.g. 65 dB speech startle to confirm other results; procedures for use of measured noise makers outlined by Northern and Downs in their book, Hearing In Children (1978).)

Concerning the evaluations of infants listed on the registry:

- Please send the results and recommendations to the High Risk Registry Program at Richland Memorial Hospital and to the infants physician.
- Refer for medical clearance if a loss is suspected and the child has not been cleared previously.
- If a hearing loss is confirmed or a second opinion is desired the infant can be referred to Project SCOOTER for Hearing Impaired Children at the University of South Carolina for immediate intervention. (services are free of charge.)
- A cooperative agreement may be worked out with Project SCOOTER whereby the referring audiologist completes the hearing aid evaluation instead of the Project audiologist(if desired).
- Any child with a hearing impairment is eligible for Crippled Childrens Services even if he/she is Medicaid eligible too.
- A periodic report (every 6 months) on the High Risk Program will be sent to all audiologists.

SUGGESTED GUIDELINE FOR SIX MONTH AUDIOLOGICAL EVALUATION

An interval history should be taken. Audiological examination should include localization audiometry using narrow band noise and/or warbled tones, and speech while employing conditioned orientation response (COR) techniques or behavior observation audiometry (BOA). In addition, impedance measurements should be taken. The impedance measurements should include estimates of acoustic compliance of the ear, tympanometry and stapedial reflex threshold. All testing for 6 month old children should be done under free field conditions using the audiometer speakers.

SOURCES FOR PEDIATRIC AUDIOMETRIC TESTING
COUNTIES SERVED BY RICHLAND MEMORIAL HOSPITAL

Audiology Clinic
Moncrief Army Hospital
Ft. Jackson, S.C. 29207
Capt. Graham Wilde, Audiologist
751-2438, 751-5406

Columbia Ear Nose and Throat
Associates
1639 Brabham Avenue
Columbia, S.C. 29204
Pat Murray, Audiologist
256-2483

Department of Mental Retardation
Midlands Center
8301 Farrow Road
Columbia, S.C. 29203
Yvonne Means, Audiologist
Charles Haynes, Audiologist 758-4632

Drs. Haile and Warder
1707 Brabham Avenue
Columbia, S.C. 29204
Helena Bogo, Audiologist
256-7076

Hearing and Speech Center
1800 Main Street
Columbia, S.C. 29203
Bill Anderson, Audiologist
Salley B. Davidson, Audiologist
252-0303

Midland Ear Nose and Throat
Clinic, P.A.
3321 Medical Park Road
Columbia, S.C. 29203
Beth Leadbitter, Audiologist
254-2495

Project SCOOTER (Free Services)
University of South Carolina
819 Barnwell Street
Columbia, S.C. 29208
Pamela Halligan, Audiologist
777-7876, 777-7829

Speech and Hearing Services
Richland Memorial Hospital
3301 Harden Street
Columbia, S.C. 29203
Helen Hall, Audiologist
765-6553

S.C. State College Speech
and Hearing Clinic
South Carolina State College
Orangeburg, S.C. 29117
Cindy Baily, Audiologist
Sharon Jenkins, Audiologist
536-7000

Williamsburg Nursing Center
1018 N. Guignard
Sumter, S.C. 29150
Bonnie Dempsey, Audiologist
773-5567

Hitchcock Rehabilitation Center
721 Richland Avenue West
Aiken, South Carolina 29801
Bonnie Dempsey, Audiologist
648-8344

Carolina Ear Nose and Throat
Drs. Frank Young and James Bowles
2311 Sunset Boulevard
West Columbia, South Carolina 29169
Helena Bogo, Audiologist
796-8060

Dr. Rocco D. Cassone
855 Holly Street
Orangeburg, South Carolina 29115
Beth Leadbitter, Audiologist
536-5511

SECTION VIII: Sample Evaluation Plan

Every program needs some method to determine its effectiveness. The sample evaluation plan may be used as a basis for program evaluation. In addition it is advisable to ask the hospital what information it would like reported and to add those questions to the list. It is likely that every hospital will have slightly different evaluation plans since some hospitals will consider certain information important and others will not. A convenient and logical system for obtaining and keeping the data should be devised. The information should be analyzed monthly and a formal report to the hospital should be made at least binannually. It is important to report the biannual results to the physicians, audiologists and nurses who are involved in the follow-up of the program.

EVALUATION PLAN

Evaluation Question	Evaluation Procedure
1. What percentage of mothers have completed the high risk screening form?	1. On a monthly basis, the number of completed instruments (high risk screening form) will be compared with the number of births to determine the percentage of return.
2. What percentage of children identified as high risk get six month audiological evaluation?	2. Every month, beginning seven months after the early identification program begins, the percentage of children receiving audiological screening will be calculated based on the numbers recommended. Furthermore, the number of children identified only by the high risk screening will be reported.
3. What percentage of children identified as hearing impaired enroll in Project SCOOTER?	3. A percentage of children identified as being hearing impaired and enrolled in Project SCOOTER will be computed.

SECTION IX: Public Awareness Development

An extremely important component of a successful High Risk Registry program is an active public awareness campaign. The more the public and professional groups know about the values of early identification of hearing loss the more support there is for the program.

As soon as possible after program approval by the hospital an active public awarenes campaign should be begun, if not before. Section IX. provides some suggestions for goals, target audiences, methods and a source for help and concrete examples.

PUBLIC AWARNESS

Goal of Public Awareness

To provide information to increase public and professional awareness of the benefits of early identification of hearing impairment and educational intervention.

Targets for Public Awareness

Parents, Educators, Pediatricians, Family Practitioners, Otolaryngologists, Speech, Hearing and Language Professionals, Civic Groups (Lions, Kiwanis, etc.), Churches, Public Health Professionals, Agencies (DSS, CCS, Health Departments) Volunteer Groups, Child Care Centers, Nursery/Kindergarten Teachers, General Public

Types of Public Awareness

Radio: spots, interviews for news, Talk Shows
Television Appearances, (Public Service Announcements, Personality Spots)
Through Advisory Board
Newspaper articles
Newsletter with bills (e.g. Bell-Tel News)
Distribution of Brochure: Mailout, Handout at Drs. office
Newsletters
Through others Newsletters
Presentations - slide cassette/audio tape or personal appearance
Video tape
Purchased professional T.V. spots
A. G. Bell fliers
Audiotapes
Other (e.g. Student Departmental Fair)

Source for Help and Concrete Examples

*** A good information source for developing media material is available through the American Speech-Language-Hearing Association. Entitled the ASHA Media Handbook, it contains basic information for developing materials to be used in a public awareness program. It is FREE upon request for ASHA members by writing: American Speech-Language-Hearing Association, Public information Division, 10801 Rockville Pike, Rockville, Maryland 29852.

SECTION X: Bibliographies

The best way to begin the conceptualization of a High Risk Registry Program is to familiarize yourself with the literature in order to develop a working knowledge of the field.

Sample bibliographies on the rationale for early identification of hearing impairment and on audiological testing of infants and young children are provided as a basis to begin.

RATIONALE FOR EARLY IDENTIFICATION OF HEARING LOSS
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AUDIOLOGICAL TESTING OF INFANTS AND YOUNG CHILDREN
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SECTION XI: Revised Forms (since June, 1979)

Richland Memorial Hospital

Hearing Screening Questionnaire

Name _____

1. Do you have any relatives who could not hear well before they were 50 years of age? YES ___ NO ___

   If yes, who were they? _____

   Do you know what kind of hearing problem it was? _____

2. During your pregnancy, did you have Three day measles, German measles, Rubella, or a rash with fever? YES ___ NO ___

3. Who will be the baby's doctor? _____

NURSES - please check if baby falls into any of the following categories:

_____a. Defects of ear, nose, or throat (cleft lip or palate, malformed ears, abnormal otoscopic)

_____b. Birth weight less than 1200 grams

_____c. Bilirubin level greater than: -12mg/100 ml for premies
-16mg/100 ml for full term

_____d. Metabolic acidosis PH≤7.15

_____e. Ototoxic Drugs: 7 days (antibiotics, diuretics)

_____f. 5 minute APGAR of less than 5

_____g. Ventilatory therapy greater than seven days duration

Please stamp and put in box. Thank you.

Richland Memorial Hospital

Hearing Screening Questionnaire

Name _____ Phone Number _____

Address _____

1. Do you have any relatives who could not hear well before they were 50 years of age? YES____ NO ____

   If yes, who were they? _____

   Do you know what kind of hearing problem it was?

   _____

2. During your pregnancy, did you have three day measles, German Measles, Rubella, or a rash with fever? YES ____ NO ____

3. Who will be the baby's doctor? _____

NURSES Please check if baby falls into any of the following categories:

___ a. Defects of ear, nose, or throat (cleft lip or palate, malformed ears, abnormal otoscopic)

___ b. Birth weight less than 1200 grams

___ c. Bilirubin level greater than: -12 mg/ml for premies
-16 mg/ml for full term

___ d. Metabolic acidosis PH $\leq$ 7.15

___ e. Ototoxic Drugs: 7 days (antibotics, diuretics)

___ f. 5 minute APGAR of $\leq$ 5

___ g. Ventilatory therapy greater than seven days duration

I give my consent for the release of this information to hospital audiologist for use in the Hearing Survey.

Parents' Signature _____

Please stamp and put in box. Thank you.

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RMH RICHLAND MEMORIAL HOSPITAL

3301 HARDEN STREET, COLUMBIA, S. C. 29203 TELEPHONE (803) 765-7011

Dear Doctor:

The Hearing Survey Questionnaire for _____ showed that:

_____ Child has a history of deafness in the family;

_____ Mother possibly had Rubella during her pregnancy;

_____ Parents are concerned their child may have a hearing loss;

_____ Child had a bilirubin above 16;

_____ Child had external ear anomolies.

Special Care Nursery

_____ Bilirubin above 12;

_____ Cleft lip - cleft palate;

_____ Low birth weight (< 1200 grams);

_____ Ototoxic drugs for at least 7 days;

_____ Five minute Apgar ≤ 5;

_____ Metabolic Acidosis (pH ≤ 7.15)

_____ Ventilatory therapy > 7 days duration

_____ Other _____ _____

Because of the above, we have entered the infant in the High Risk Registry. This program is for screening purposes. It will detect 75-90% of all children with congenital hearing loss. Congenital hearing deficits occur in at least 1 in every 1000 deliveries.

We appreciate your cooperation.

Sincerely,

Tom Austin, MD.

Tom L. Austin, M.D.
Director, Division of
Neonatology

_____
Audiologist
Richland Memorial Hospital

Name of Child _____

Parents _____

→

In addition to medical diagnosis we recommend audiological testing at 6 months of age to include localization audiometry and impedance measurements.

All children in South Carolina suspected of having a hearing problem are eligible for free diagnostic hearing evaluations through the Crippled Children's program. Application may be made through the county health department of the parent's resident.

Hearing evaluation is also a covered service of the Medicaid program.

SOURCES FOR PEDIATRIC AUDIOMETRIC TESTING
COUNTIES SERVED BY RICHLAND MEMORIAL HOSPITAL

Audiology Clinic
Moncrief Army Hospital
Ft. Jackson, S.C. 29207
Capt. Timothy Swisher, Audiologist
751-2438, 751-5406

Columbia Ear Nose and Throat Associates
1639 Brabham Avenue
Columbia, S.C. 29204
Pat Murray, Audiologist
256-2483

Department of Mental Retardation
Midlands Center
8301 Farrow Road
Columbia, S.C. 29203
Cynthia Earle, Audiologist
758-5632

Drs. Haile and Warder
2750 Laurel Street
Suite 203
Columbia, S.C. 29204
Helena Bogo, Audiologist
256-7076

Hearing and Speech Center
1800 Main Street
Columbia, S.C. 29203
Bill Anderson, Audiologist
252-0303

Midland Ear Nose and Throat
Clinic, P.A.
3321 Medical Park Road
Columbia, S.C. 29203
Betsy Wade, Audiologist
254-2495

Project SCOOTER
University of South Carolina
819 Barnwell Street
Columbia, S.C. 29208
Pamela Halligan, Audiologist
777-7876, 777-7829

Speech and Hearing Services
Richland Memorial Hospital
3301 Harden Street
Columbia, S.C. 29203
Joan Kammer, Audiologist
765-6553

S.C. State College Speech
and Hearing Clinic
South Carolina State College
Orangeburg, S.C. 29117
Cindy Baily, Audiologist
Sharon Jenkins, Audiologist
Joseph Marinak, Audiologist
536-7000

Williamsburg Nursing Center
1018 N. Guignard
Sumter, S.C. 29150
Bonnie Dempsey, Audiologist
773-5567

Hitchcock Rehabilitation Center
721 Richland Avenue West
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Lynn Burnett, Audiologist
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Cynthia Earle, Audiologist
758-5632

Drs. Haile and Warder
2750 Laurel Street
Suite 203
Columbia, S.C. 29204
Helena Bogo, Audiologist
256-7076

Hearing and Speech Center
1800 Main Street
Columbia, S.C. 29203
Bill Anderson Audiologist
252-0303

Midland Ear Nose and Throat
Clinic, P.A.
3321 Medical Park Road
Columbia, S.C. 29203
Betsy Wade, Audiologist
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Project SCOOTER
University of South Carolina
819 Barnwell Street
Columbia, S.C. 29208
Pamela Halligan, Audiologist
777-7876, 777-7829

Speech and Hearing Services
Richland Memorial Hospital
3301 Harden Street
Columbia, S.C. 29203
Joan Kammer, Audiologist
765-6553

S.C. State College Speech
and Hearing Clinic
South Carolina State College
Orangeburg, S.C. 29117
Cindy Baily, Audiologist
Sharon Jenkins, Audiologist
Joseph Marinak, Audiologist
536-7000

Williamsburg Nursing Center
1018 N. Guignard
Sumter, S.C. 29150
Bonnie Dempsey, Audiologist
773-5567

Hitchcock Rehabilitation Center
721 Richland Avenue West
Aiken, S.C. 29801
Bonnie Dempsey, Audiologist
648-8344

Dr. Rocco D. Cassone
855 Holly Street
Orangeburg, S.C. 29115
Lynn Burnett, Audiologist
536-5511

RMH RICHLAND MEMORIAL HOSPITAL

3301 HARDEN STREET, COLUMBIA, S. C. 29203 TELEPHONE (803) 765-7011

Name of Child: _____

Dear Parent:

Richland Memorial Hospital is conducting a program to identify newborn children with possible hearing difficulty. Such infants as those who have been in the Neonatal Intensive Care Unit (NICU), have certain abnormal physical findings at birth or come from families with a history of hearing disorders are identified as being 'at risk'. Please note, the term 'at risk' does not automatically mean a child will have a hearing loss. Your child has been identified as 'at risk' and therefore we recommend that you obtain medical attention on this potential problem.

Please schedule an appointment for your child with the physician of your choice. When you do so, take the enclosed card to your appointment and request the findings be mailed to Speech and Hearing, High Risk Registry Program, Richland Memorial Hospital.

Hopefully, the use of the hearing registry will enable early educational assistance for children found to have hearing difficulty. Please contact the Speech and Hearing Department at 765-6553 if you have any questions.

Sincerely,

_____

Audiologist
Richland Memorial Hospital

RMH RICHLAND MEMORIAL HOSPITAL

3301 HARDEN STREET, COLUMBIA, S. C. 29203 TELEPHONE (803) 765-7011

1980

Dear Physician:

Richland Memorial Hospital, in conjunction with Project SCOOTER for Hearing Impaired Children at the University of South Carolina, is conducting a program to identify newborn children with possible hearing difficulty. Such infants as those who have been in the Neonatal Intensive Care Unit (NICU), have certain abnormal physical findings at birth or come from families with a history of hearing disorders are identified as being at risk. Please note the term "at risk" does not automatically mean a child will have a hearing loss.

The goals of the High Risk Register are: to identify infants who have congenital hearing impairment serious enough to handicap speech and language development; to establish statistical information as to the incidence of hearing loss among high risk infants from the seventeen (17) counties served by Richland Memorial Hospital; and to add to medical science's knowledge of the causes of hearing loss.

If one of your patients is so identified as "at risk" and is placed on the registry, you will be notified. Sources for indepth audiological evaluations will be provided to you. The parents will also receive notification by letter and will be requested to take an enclosed card to their next appointment with you. It is not the intent of the registry to alarm parents unnecessarily, but rather to inform them of a potential problem that requires follow-up evaluation. We would appreciate you filling out the card and returning it to the Speech and Hearing Department at Richland Memorial Hospital. Enclosed is a summary and flow chart of the program which may be helpful in answering any questions parents may have concerning the register.

Thank you for your assistance with this program. Please do not hesitate to call the Speech and Hearing Department at 765-6553 if you have any questions.

Sincerely,

Gerald P. Berkowitz, M.D.
Assistant Director
Division of Neonatology

Joan M. Kammer, M.Ed.
Audiologist

Editor's Note:

The following expanded position statement of the Joint Committee on Infant Hearing was adopted by the Legislative Council of ASHA in November, 1981. Representatives of the member organizations who prepared this statement include: American Speech-Language-Hearing Association -- Arthur Dahle, Sanford Gerber, Laszlo Stein, Evelyn Cherow, Ex-Officio and Martha Rubin, Chair; Marion Downs and George Mencher, consultants; Academy of Otolaryngology -- Ralph Naunton and Kenneth Grundfast (Committee on Hearing and Equilibrium); American Academy of Pediatrics -- Robert Hall (Committee on Fetus and Newborn); and the American Nurses Association -- Violet Katz.

JOINT COMMITTEE ON INFANT HEARING
POSITION STATEMENT 1982

Early detection of hearing impairment in the affected infant is important for medical treatment and subsequent educational intervention to assure development of communication skills.

In 1972, the Joint Committee on Infant Hearing Screening recommended screening all newborns by means of five criteria to identify infants At-Risk for hearing impairment and suggested follow-up audiological evaluation of these infants until accurate assessments of hearing could be made. Since the incidence of moderate to profound hearing loss in the At-Risk infant group is 2.5% - 5%, audiologic testing of this group is warranted. Acoustic testing of all newborn infants has a high incidence of false positive and false negative results and is not universally recommended at the present time.

Recent research suggests the need for expansion and clarification of the 1972 criteria. This 1982 statement expands the Risk Criteria and makes recommendations for the evaluation and treatment of the hearing-impaired infant.

I. IDENTIFICATION

A. Risk Criteria
The factors that identify those infants who are AT RISK for having hearing impairment include the following:

1. A family history of childhood hearing impairment.
2. Congenital perinatal infection (e.g., cytomegalovirus, rubella, Herpes, toxoplasmosis, syphilis).
3. Anatomic malformations involving the head or neck (e.g., dysmorphic appearance including syndromal and non-syndromal abnormalities, overt or submucous cleft palate, morphologic abnormalities of the pinna).

4. Birthweight less than 1500 grams.
5. Hyperbilirubinemia at level exceeding indications for exchange transfusion.
6. Bacterial meningitis, especially H. influenzae.
7. Severe asphyxia which may include infants with Apgar scores of 0-3 who fail to institute spontaneous respiration by 10 minutes and those whith hypotonia persisting to two hours of age.

B. SCREENING PROCEDURES

The hearing of infants who manifest any item on the list of risk criteria should be screened preferably under the supervision of an audiologist, optimally by 3 months of age but not later than six months of age. The initial screening should include the observation of behavioral or electrophysiological response to sound.* If consistent electrophysiological or behavioral responses are detected at appropriate sound levels, then the screening process will be considered complete except in those cases where there is a probability of a progressive hearing loss; e.g., family history of delayed onset, degenerative disease, or intra-uterine infections. If results of an initial screening of an infant manifesting any risk criteria are equivocal, then the infant should be referred for diagnostic testing.

*This Committee has no recommendations at this time regarding any specific device.

II. DIAGNOSIS FOR INFANTS FAILING SCREENING

A. Diagnostic evaluation of an infant under six months of age includes:

1. General physical examination and history including:
   a. Examination of the head and neck
   b. Otoscopy and otomicroscopy
   c. Identification of relevant physical abnormalities
   d. Laboratory tests such as urinalysis and diagnostic tests for perinatal infections.
2. Comprehensive audiological evaluation:
   a. Behavioral history
   b. Behavioral observation audiometry
   c. Testing of auditory evoked potentials, if indicated

B. After the age of six months, the following are also recommended:

1. Communication skills evaluation
2. Acoustic immitance measurements
3. Selected tests of development

III. MANAGEMENT OF THE HEARING IMPAIRED INFANT

Habilitation of the hearing-impaired infant may begin while the diagnostic evaluation is in process. The Committee recommends however, that whenever possible, the diagnostic process should be completed and habilitation begun by the age of six months. Services to the hearing-impaired infant under six months of age include:

A. Medical Management
   1. Reevaluation
   2. Treatment
   3. Genetic evaluation and counseling when indicated

B. Audiologic Management
   1. Ongoing audiological assessment
   2. Selection of hearing aid(s)
   3. Family counseling

C. Psychoeducational Management
   1. Formulation of an individualized educational plan
   2. Information about the implications of hearing-impairment

After the age of six months, the hearing-impaired infant becomes easier to manage in a habilitation plan but s/he will require the services listed above.

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